

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
6 November 2003 (06.11.2003)

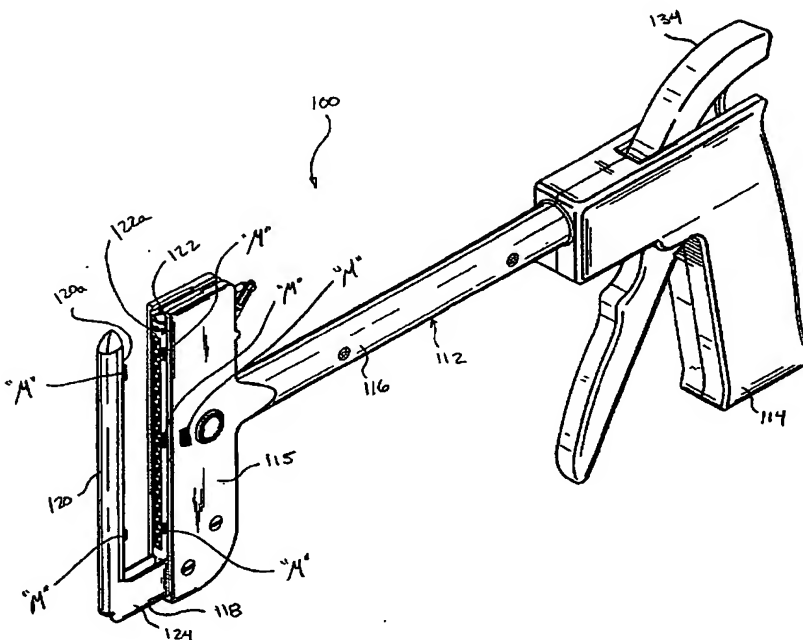
PCT

(10) International Publication Number
WO 2003/090630 A3

- (51) International Patent Classification⁷: **A61B 17/068**, 17/115, 17/28, 17/072, 19/00
- (21) International Application Number: PCT/US2003/013056
- (22) International Filing Date: 25 April 2003 (25.04.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/375,495 25 April 2002 (25.04.2002) US
60/375,496 25 April 2002 (25.04.2002) US
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- (88) Date of publication of the international search report:
8 April 2004

[Continued on next page]

(54) Title: SURGICAL INSTRUMENTS INCLUDING MICRO-ELECTROMECHANICAL SYSTEMS (MEMS)



(57) Abstract: Surgical instruments (100) are disclosed that are couplable to or have an end effector or a disposable loading unit with an end effector, and at least one micro-electromechanical system (MEMS) device operatively connected to the surgical instrument (100) for at least one of sensing a condition, measuring a parameter and controlling the condition and/or parameter.

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WO 2003/090630 A3



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107510940

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61B17/068 A61B17/115 A61B17/28 A61B17/072 A61B19/00

Held, G PTO 03 OCT 2004

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 03 020139 A (LAZEROMS MARKUS CORNELIS JACOB ; VLEUGELS MICHEL PETRONELLA HUB (NL) 13 March 2003 (2003-03-13) page 3, line 9 - line 30 page 8, line 2 - line 19 figures ---	1-7, 69
X	US 5 395 033 A (BYRNE MARK T ET AL) 7 March 1995 (1995-03-07) column 1, line 66 - line 68; figures ---	1-6, 8, 10, 12-16, 30, 31, 69
X	WO 01 62164 A (POWERMED INC) 30 August 2001 (2001-08-30) page 6, line 12 - page 7, line 14 page 13, line 26 - page 14, line 5 figures ---	1-6, 8, 9, 11
-/-		

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

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T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

15 December 2003

Date of mailing of the international search report

13. 01. 04

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Held, G

INTERNATIONAL SEARCH REPORT

Inte application No.
PCT/US 03/13056

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-11

Claim 4 - 11 define a surgical stapler wherein the special technical feature is a staple cartridge assembly and an anvil.

The objective problem posed is to provide a surgical instrument for connecting tissue.

2. Claims: 12-16

Claims 12 - 16 define an end effector. The special technical feature is a jaw mechanism including a pair of jaw members pivotably coupled to the distal end of an elongate shaft.

The objective problem which is addressed by said group of claims is the actuation mechanism of a surgical instrument.

3. Claims: 17,32-52

Claims 17 and 32 define a robotic system wherein the special technical feature is a robotic arm and an actuation assembly for controlling operation of an movement of the robotic arm. The objective problem posed is to automatize a surgical procedure.

4. Claims: 18-29,53-68

Claims 18 and 52 define a loading unit for use with a surgical instrument. The special technical feature of this group of invention is an elongate tubular shaft which allows to connect an end effector to a surgical instrument. The objective problem of said group of claims is to provide a surgical instrument which allows to connect different end effectors.

5. Claims: 30,31

The special technical features of this group of claims are related to the connection of the MEMS device to a control box.

The objective problem is the electrical connection of the MEMS devices.

6. Claim : 69

Independent claim 69 defines a surgical instrument wherein the special technical feature is an end effector comprising

FURTHER INFORMATION CONTINUED FROM PCT/SA/ 210

a pair of juxtaposable jaws and an approximation mechanism for approximating the pair of jaws. The objective problem posed is to achieve a more precise surgical operation.

INTERNATIONAL SEARCH REPORT

International Publication No.
PCT/US 03/13056

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 51486 A (COMPUTER MOTION INC) 8 September 2000 (2000-09-08) page 1, paragraph 2 page 32, paragraph 2 -page 33, paragraph 2 ---	32
A	US 6 231 565 B1 (RATCLIFF KEITH ET AL) 15 May 2001 (2001-05-15) cited in the application the whole document ---	1-69
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Publication No

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